**3GPP TSG-RAN WG2 Meeting #110-e *R2-20xxxxx***

June 1 – June 12 2020

**Agenda item: 6.22.2**

**Source: Huawei, HiSilicon**

**Title: Summary of [AT110e][039][eURLLC] RRC (Huawei)**

**Document for: Discussion and Decision**

# 1 Introduction

This document is used to collect the feedback on the URLLC RILs for discussion via email for the following email discussion for eURLLC.

* [AT110e][039][eURLLC] RRC (Huawei)

Scope: Treat All Relevant Review Issues (RIL) and tdocs under 6.22.2

 Intended outcome: Agreed 38331 CR Building on the baseline

 Deadline: June 11, 0700 UTC

The summary will be presented based on the outcome of the email discussion.

# 2 Discussion

## 2.1 [H603]

In the last RAN1#100bis e-meeting, the priority for UL CI was discussed with respect to the indicated UL transmission priority level and has made the following agreement.

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| Agreeement:* If both UL CI and intra-UE priority indicator are configured for a given UE, support a new RRC parameter to configure Behavior #1
	+ Behaviour #1: UL CI is only applicable to the UL transmissions indicated/configured as low priority level
* When the RRC parameter is not provided to the UE, behaviour #2 is used
	+ Behaviour #2: UL CI is applicable to UL transmission irrespective of its priority level
* Note: the RRC signaling details will be decided by RAN2
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According to the RAN1 input in [1], a parameter of uplinkCancellationPriority is configured to indicate Behaviour#1 or #2 as proposed in [4]. However, [2] proposed to introduce two separate RRC parameters for CG and DG, respectively.

As the rapporteur, we think the proposal from [2] will indeed revert the RAN1 agreement and therefore think we should discuss more.

**Question 1. Do you think which option should be agreed?**

* Option 1: Introduce a RRC parameter of uplinkCancellationPriority-r16 to indicate Behavior#1 or #2
* Option 2: Introduce two separate RRC parameters of cg-UplinkCancellationPriority-r16 and dg-UplinkCancellationPriority-r16 for CG and DG, respectively?

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| **Company** | **Option1/2** | **Comments (if any)** |
| HW | Option 1 | It is a R1 parameter and has no impact to L2 functionalities, so any change should be discussed in RAN1, we prefer to stick to RAN1 input. |
| Ericsson | Option 1 | Ericsson shares the view with HW that since RAN1 agreement does not distinguish between CG and DG, this applies for both configured grant and dynamic grant.  |
| OPPO | Option 2 | As we understood, the issue is not fully discussed in RAN1, and RAN1 has left the signalling design work to RAN2. As we mentioned in [2], the situation to CG and DG is different. In details:* For DG, UL transmission is controlled by the gNB completely. So the gNB can avoid inter-UE interference by UL CI and reasonable scheduling.
* For CG, considering the availability of data associated to CG is unaware to the gNB, the actual PUSCH transmission is out of control of the gNB, and the gNB may schedule another UE using the same uplink resource to avoid resource waste. At this time, if there is CG transmission with high priority, CG transmission will not be cancelled even if UL CI indicates the same resource unavailable. The inter-UE interference exists between this CG and another high priority transmission which triggers UL CI, which is not what we want.

Thus, for CG, a better way is to apply Behaviour#2, whereas for DG, it is ok to apply Behaviour#1. That is why we propose to introduce the new RRC parameter to CG-PUSCH and DG-PUSCH separately. |
| Qualcomm | Option 1 | We think we should respect RAN1 agreement, which does not distinguish between CG and DG. |
| CATT | Option 1 | Option 1 is consistent with RAN1 decision. |

## 2.2 [E283] [E288]

Regarding the field description of the following parameter, E283 and E288 are mainly to discuss the clarification of the highlight sentence.

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| ***antennaPortsFieldPresenceForDCI-Format0-2***Configure the presence of "Antenna ports" field in DCI format 0\_2. When the field is configured, then the "Antenna ports" field is present in DCI format 0\_2. Otherwise, the field size is set to 0 for DCI format 0\_2 (See TS 38.212 [17], clause 7.3.1.1.3). The parameter is used to enable 0 for "Antenna port(s)" in DCI format 0\_2 while one or more of *dmrs-UplinkForPUSCH-MappingTypeAForDCI-Format0-2* and *dmrs-UplinkForPUSCH-MappingTypeBForDCI-Format0-2* is configured to a UE. If none of *dmrs-UplinkForPUSCH-MappingTypeAForDCI-Format0-2* and *dmrs-UplinkForPUSCH-MappingTypeBForDCI-Format0-2* is configured to the UE, then the parameter *antennaPortsFieldPresenceForDCI-Format0-2* is not configured neither. |

**[Description]**: Similar to E283/E288, as “0” is enabled by the absence of the field, this part is a bit confusing.

In the case neither is configured, does that mean the field size for “antenna ports” is 0 or does that mean the field size for “antenna ports” is set to a default value?

After checking the TS 38.212 v16.1.0, as the rapporteur, we would like to confirm in this case, the antenna point field size is 0 bit (the RRC parameter is not configured). And in case at least one is configured, this parameter can be also used to indicate “0 bit” for this field as described above.

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| - Antenna ports – number of bits determined by the following:- 0 bit if higher layer parameter *AntennaPorts-FieldPresence-ForDCIFormat0\_2* is notconfigured; |

**Question 2. Do you agree with the rapporteur RAN2 understanding is that,**

**if neither of dmrs-UplinkForPUSCH-MappingTypeAForDCI-Format0-2 and dmrs-UplinkForPUSCH-MappingTypeBForDCI-Format0-2 is configured to the UE, the parameter of antennaPortsFieldPresenceForDCI-Format0-2 is not configured, i.e. the field size is set to 0 bit.”**

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| **Company** | **Y/N** | **Comments (if any)** |
| HW | Y | Can improve the wording, e.g. add the sentence “i.e. the field size is set to 0 bit.” |
| Ericsson | Y | Thank you for HW pointing out that part on 38.212 v16.1.0. Ericsson’ view is that the wording must be improved. Firstly, the original wording is from RAN1 parameter list. It neither follows RRC convention nor easy to follow. To understand better, I have rephrased one of the field descriptions in the ASN.1 review version 166 from

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| Configure the presence of "Antenna ports" field in DCI format 0\_2. When the field is configured, then the "Antenna ports" field is present in DCI format 0\_2. Otherwise, the field size is set to 0 for DCI format 0\_2 (See TS 38.212 [17], clause 7.3.1.1.3). The parameter is used to enable 0 for "Antenna port(s)" in DCI format 0\_2 while one or more of dmrs-DownlinkForPUSCH-MappingTypeAForDCI-Format1-2 and dmrs-downlinkForPUSCH-MappingTypeBForDCI-Format1-2 is configured to a UE. If none of dmrs-DownlinkForPUSCH-MappingTypeA-ForDCI-Format1-2 and dmrs-DownlinkForPUSCH-MappingTypeB-ForDCI-Format1-2 is configured to the UE, then the parameter antennaPortsFieldPresenceForDCI-Format1-2 is not configured neither. |

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| Configure the presence of "Antenna ports" in DCI format 0\_2. If this field is configured, then the "Antenna ports" is present in DCI format 0\_2. Otherwise, the number of bits for ”Antenna ports” is 0 for DCI format 0\_2 (See TS 38.212 [17], clause 7.3.1.1.3). If either dmrs-DownlinkForPUSCH-MappingTypeAForDCI-Format1-2 or dmrs-downlinkForPUSCH-MappingTypeBForDCI-Format1-2 is configured, this field is used to enable 0 for "Antenna port(s)" in DCI format 0\_2. Otherwise, this field is not configured. |

From the above green text. It seems the understanding is as below* The number of bits for antenna port is by default 0 (i.e., no higher layer parameter is configured)
* if either dmrs-DownlinkForPUSCH-MappingTypeAForDCI-Format1-2 or dmrs-DownlinkForPUSCH-MappingTypeBForDCI-Format1-2 is configured, then AntennaPorts-FieldPresence-ForDCIFormat0\_2 can be set to be enabled and so the number of bits can be larger than 0.

The purpose of the below sentence is not clear. “If either dmrs-DownlinkForPUSCH-MappingTypeAForDCI-Format1-2 or dmrs-downlinkForPUSCH-MappingTypeBForDCI-Format1-2 is configured, this field is used to enable 0 for "Antenna port(s)" in DCI format 0\_2.”It seems that we are describing some basic functionality of RRC signalling. I suggest RAN2 removes that part, and the second paragraph can simply be

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| If neither dmrs-DownlinkForPUSCH-MappingTypeAForDCI-Format1-2 nor dmrs-downlinkForPUSCH-MappingTypeBForDCI-Format1-2 is configured, this field is absent. |

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| OPPO | Y | Current version is unclear. We prefer the modication provided by Ericsson. |
| Qualcomm | Y | We can accept Ericsson’s text, which is more succinct.  |
| CATT | Y |  |

## 2.3 [E297]

Regarding the field description of invalid symbol pattern, E297 pointed out the sentence highlighted as below is not clear.

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| ***invalidSymbolPattern***Indicates one pattern for invalid symbols for PUSCH transmission repetition type B applicable to both DCI format 0\_1 and 0\_2. If *InvalidSymbolPattern* is not configured, semi-static flexible symbols are used for PUSCH. Segmentation occurs only around semi-static DL symbols. If *invalidSymbolPattern* is configured and *invalidSymbolPatternIndicatorForDCI-Format0-2* is not configured, segmentation occurs around semi-static DL symbols and invalid symbols in the pattern, and the remaining symbols are used for PUSCH (see TS 38.214 [19] clause 6.1). |

**[Description]**: The name here is not indicative to the intention of the configuration. It seems that the part “this field is present and invalidSymbolPatternIndicatorForDCI-0-1 is not present“ is not captured

After checking the TS 38.214 and TS 38.212, as the rapporteur, we would like to confirm that *invalidSymbolPattern* is used to indicate the invalid symbol pattern while *invalidSymbolPatternIndicatorForDCI-0-1* and *invalidSymbolPatternIndicatorForDCI-0-2* are used to indicate whether there is a field of “Invalid symbol pattern indicator” in the DCI format 0\_1 and 0\_2, respectively. In summary, our understanding on how they work is:

* If the *invalidSymbolPatternIndicatorForDCI-0-1/0-2* is not configured, the UE shall apply the invalid symbol pattern (follow RRC).
* If the *invalidSymbolPatternIndicatorForDCI-0-1/0-2* is configured, there is a field of “Invalid symbol pattern indicator” in DCI format 0\_1/0\_2 (follow DCI + RRC)
	+ If the “Invalid symbol pattern indicator” is set to 1, the UE shall apply the invalid symbol pattern.
	+ If the “Invalid symbol pattern indicator” is set to 0, the UE shall not apply the invalid symbol pattern.

The following text can be found in TS 38.214 v16.1.0 and TS 38.212 v16.1.0, respectively.

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| -     if the PUSCH is scheduled by DCI format 0\_1, or corresponds to a Type 2 configured grant activated by DCI format 0\_1, and if *InvalidSymbolPatternIndicator-ForDCIFormat0\_1* is configured,-     if invalid symbol pattern indicator field is set 1, the UE applies the invalid symbol pattern;-     otherwise, the UE does not apply the invalid symbol pattern;-     if the PUSCH is scheduled by DCI format 0\_2, or corresponds to a Type 2 configured grant activated by DCI format 0\_2, and if *InvalidSymbolPatternIndicator-ForDCIFormat0\_2* is configured,-     if invalid symbol pattern indicator field is set 1, the UE applies the invalid symbol pattern;-     otherwise, the UE does not apply the invalid symbol pattern;- otherwise, the UE applies the invalid symbol pattern. |

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| - Invalid symbol pattern indicator – 0 bit if higher layer parameter *InvalidSymbolPatternIndicator-ForDCIFormat0\_2* is not configured; otherwise 1 bit as defined in Clause 6.1.2.1 in [6, TS 38.214]. |

Therefore, as the rapporteur, we think the highlighted sentence is incomplete but technically correct (the UE shall follow RRC). Given the complexity of the mechanism and it is already clear in the RAN1 TS, we propose to remove above sentence and details can be found in RAN1 TS.

**Question 3. Do you agree with the rapporteur to remove the following sentence in the field description of *invalidSymbolPattern* ?**

**If *invalidSymbolPattern* is configured and *invalidSymbolPatternIndicatorForDCI-Format0-2* is not configured, segmentation occurs around semi-static DL symbols and invalid symbols in the pattern, and the remaining symbols are used for PUSCH.**

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| **Company** | **Y/N** | **Comments (if any)** |
| HW | Y | It is already clear in RAN1 TS, no need to duplicate the description given the complexity to make it clear in RRC. |
| Ericsson | Y | In addition to the above comment by HW, RRC is more suitable for capturing configuration restriction not detailed PHY behaviours.  |
| OPPO | Y | We don’t need to capture RAN1 details in RRC spec. |
| Qualcomm | Y |  |
| CATT | Y |  |

## 2.4 [H605] [H609]

There is an Editor’s note put for UCI on PUSCH list

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| ***uci-OnPUSCH-ListForDCI-Format0-1, uci-OnPUSCH-ListForDCI-Format0-2***Configuration for up to 2 HARQ-ACK codebooks specific to DCI format 0\_1/0\_2. The field uci-OnPUSCH-ListForDCI-Format0-1 refers to DCI format 0\_1 and the field uci-OnPUSCH-ListForDCI-Format0-2 refers to DCI format 0\_2, respectively (see TS 38.212 [17], clause 7.3.1 and TS 38.213 [13] clause 9.3).Editor's note: FFS on the definition for uci-OnPUSCH-ListForDCI-Format0-2. |

There is two Editor’s notes put for scaling IE for UCI on PUSCH.

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| ***scalingForDCI-Format0-2***Indicates a scaling factor to limit the number of resource elements assigned to UCI on PUSCH for DCI Format 0\_2. Value f0p5 corresponds to 0.5, value *f0p65* corresponds to 0.65, and so on (see TS 38.212 [17], clause 6.3).Editor's note: Whether the scaling is shared or separate for DCI format 0\_1 and DCI format 0\_2.Editor's note: Whether and how to apply the scaling for PUSCH with configured grant. |

[5] proposed to clean up the Editor’notes put by the rapporteur which are used to remind RAN2 to check, and they have been there for a long period. After double checking with RAN1 status, as the rapporteur, we think they can be removed.

**Question 4. Do you agree with the rapporteur to remove the following Editor’s note.**

1 Editor's note: FFS on the definition for uci-OnPUSCH-ListForDCI-Format0-2.

2 Editor's note: Whether the scaling is shared or separate for DCI format 0\_1 and DCI format 0\_2.

3 Editor's note: Whether and how to apply the scaling for PUSCH with configured grant.

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| **Company** | **Y/N** | **Comments (if any)** |
| HW | Yes to all | We did not receive any technical comments on these IEs, so we assume they are correct at least for the time being. In case any issue is identified by RAN1 or RAN2, we can come back. |
| Ericsson | Yes to all |  |
| OPPO | Yes to all |  |
| Qualcomm | Yes to all |  |
| CATT | Yes |  |

## 2.5 [E229] Flagged

E229 proposed to change the terminology of “tci-PresentInDCI-ForDCI-Format1-2” due to duplicated “DCI”

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| E229 | URLLC | 2 | PropAgree2 | Huawei | There are 65 parameters scattered across several IEs with the suffix "ForDCI-Format1-2" and this suffix is the only way to find them all.Therefore, we think it is not a good idea to change this suffix just for one out of 65 parameters. |

**Question 5. Do you think the terminology of “tci-PresentInDCI-ForDCI-Format1-2” should be changed as E229?**

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| **Company** | **Y/N** | **Comments (if any)** |
| HW | N | We should keep a common suffix for all parameters specific to DCI format 1-2 |
| Ericsson | Y | Firstly, this issue is class 2, and the procedure seems to be that this is handled in the ASN.1 review session. Nevertheless, please find Ericsson’s view below. Ericsson agrees that RAN2 should keep a common suffix for these parameters and RAN2 can further discuss how to systematically change all of them according to RRC naming convention, in particular, the one in A.3.1.2- Identifiers, other than PDU identifiers, longer than 25 characters should be avoided where possible. It is recommended to use abbreviations, which should be done in a consistent manner i.e. use 'Meas' instead of 'Measurement' for all occurrences. Examples of typical abbreviations are given in table A.3.1.2.1-1 below.Sorry for the typo in the proposed change. The intention of the RIL is to change “tci-PresentInDCI-ForDCI-Format1-2” to “tci-PresentForDCI-Format1-2”.The suffix “ForDCI-Format1-2” is kept there.  |
| OPPO | Y | We have no strong view, but we have sympathy on Ericsson’ concern. Thus, it is acceptable to us with the modification provided above, i.e. “tci-PresentInDCI-ForDCI-Format1-2” to “tci-PresentForDCI-Format1-2”.  |
| Qualcomm | - | We don’t have a strong view on this issue. Either is fine with us. |
| CATT | - | No strong view. |

## 2.6 Others

In order to differentiate the parameter specific for DCI format 0-1/0-2/1-2, we tried to put the sentence as

The field *xx* refers to DCI format 1\_1 and the field *yy* refers to DCI format 1\_2, respectively

However, after thinking more, it seems “refers to” maybe doesn't have a clear meaning in such sentences, and “applies to” looks better. As the rapporteur, we appreciate if you could provide suggestion on this.

**Question 6. Do you think “refers to” can be replaced by “applies to” for better understanding?**

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| **Company** | **Y/N** | **Comments (if any)** |
| HW | Y | Open to other suggested wordings. |
| Ericsson |  | I agree “refer” is not precise. “applies” is used in other places like “UE applies the value x”. No strong view on this.One suggestion from Ericsson is to follow the first verb in the field description. One example is as below, if the first verb is indicate, * The field *xx* **indicates the configurations** for DCI format 1\_1
 |
| OPPO | Y | “applies to” is precise and sufficient. |
| Qualcomm | Y | Agree “applies to” is better than “refers to” |
| CATT | Y | “applies to” is accurate. |

There are plenty of RRC parameters with suffix DCI-Format 0\_1/0\_2/1\_2 in PDSCH-Config/PUSCH-Config, and we have made the first attempt by trying to group some parameters together with a “hat” for a feature. For instance,

priorityIndicator SEQUENCE {

 priorityIndicatorForDCI-Format1-2-r16 ENUMERATED {enabled} OPTIONAL, -- Need S

 priorityIndicatorForDCI-Format1-1-r16 ENUMERATED {enabled} OPTIONAL -- Need S

pusch-RepTypeIndicator SEQUENCE {

 pusch-RepTypeIndicatorForDCI-Format0-2-r16 ENUMERATED { pusch-RepTypeA, pusch-RepTypeB} OPTIONAL, -- Need M

 pusch-RepTypeIndicatorForDCI-Format0-1-r16 ENUMERATED { pusch-RepTypeA, pusch-RepTypeB} OPTIONAL -- Need M

 },

configurableFieldForDCI-Format1-2 SEQUENCE {

 harq-ProcessNumberSizeForDCI-Format1-2-r16 INTEGER (0..4) OPTIONAL, -- Need M

 dmrs-SequenceInitializationForDCI-Format1-2-r16 ENUMERATED {enabled} OPTIONAL, -- Need S

 numberOfBitsForRV-ForDCI-Format1-2-r16 INTEGER (0..2) OPTIONAL, -- Need M

 ...

Technically, the current structure works as we already captured every L1 parameter in a “safest” way, but from the ASN.1 structure view as the rapporteur, we admit they are not optimal. But it is very difficult to figure out a way to restructure, e.g. introduce a PDSCH-Config-ForDCI-Formatxx as some parameters are specific for this DCI format while there are some other parameters related to PDSCH is common with the legacy. And some parameters are placed in different IE. As the rapporteur we would appreciate if any good suggestion to improve the readability.

We also noticed it may also related to the following ASN.1 discussions. So if it is decided to discuss this issue in the dedicated discussion, it would be fine. Otherwise, we can take this opportunity to discuss and see if there is an answer. This is an open question and can be discussed later.

**ASN1 Structure E228 E230 S656 E230 E228**

[R2-2004952](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_110-e%5CDocs%5CR2-2004952.zip) [E228][E230] On grouping similar parameters in PUSCH-Config/PDSCH-Config Ericsson draftCR Rel-16 38.331 16.0.0 NR\_L1enh\_URLLC-Core Late

**Question 7. How to improve the structure of PDSCH-Config/PUSCH-Config for DCI format 0-1/0-2/1-2?**

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| **Company** | **Y/N** | **Comments (if any)** |
| Ericsson |  | As the proponent company, in the paper R2-2004952, Ericsson prefers to group them under the umbrella configurableFieldsForDCI-Format0-1 configurableFieldsForDCI-Format0-2configurableFieldsForDCI-Format1-2Ericsson’s understanding is that the Rel-16 enhancement is mainly on the flexibility of the DCI field size configuration and the umbrella name suggests this. Additionally, this umbrella can help reducing some of the super long field names with suffix “ForDCI-Formatx-x”.Ericsson welcomes further suggestion. In particular, Ericsson would like to know more details of the concern raised above by the rapportuer. This would help in finding a better structure. The concern is copied here. “e.g. introduce a PDSCH-Config-ForDCI-Formatxx as some parameters are specific for this DCI format while there are some other parameters related to PDSCH is common with the legacy. And some parameters are placed in different IE.”  |
| OPPO |  | We have no strong views, but for the intention of readability, we are fine to group the related IEs if no issue is found and no much work is needed. |
| CATT |  | We have sympathy on Ericsson’s revision. |

# 3 Conclusions

# 4 Reference

[1] R1-2003190 Updated consolidated parameter list for Rel-16 NR.

[2] R2-2005342 [H603] How to support UL CI for UL Transmission OPPO

[3] R2-2005475 Correction to RRC spec for eURLLC Huawei, HiSilicon

[4] R2-2005478 [H600]-[H603] Capturing the updated L1 parameters from RAN1#100bis-e Huawei, HiSilicon

[5] R2-2005479 [H604] [H605] [H609] Clean-up of the remaining Editor's notes for L1 parameters Huawei, HiSilicon

# Annex RIL status

H056: ConcAgree WI-CR

H057: ConcAgree WI-CR

H022: ConcAgree WI-CR

H041: ConcAgree WI-CR

H052: ConcAgree WI-CR

H044: ConcAgree WI-CR

H053: ConcAgree WI-CR

H042: ConcAgree WI-CR

H034: ConcAgree WI-CR

H025: ConcAgree WI-CR

H050: ConcAgree WI-CR

H051: ConcAgree WI-CR

H029: ConcAgree WI-CR

H055: ConcReject

H032: ConcReject

E126: PropAgree-> terminology change, can be agreed simply.

E281/E284/E285/E286/E290/E291/E292/E293/E294/E295/E298/E299/E300/E301/E302: PropAgree

E296: PropAgree –>See comment, can add a new conditional presence for RepTypeB

E304: ProgAgree-> See comment, it has been already captured and clear in TS 38.214, can remove the sentence and the field description

H600: PropAgree-> straightforward, follow RAN1 progress

H601: PropAgree-> straightforward, follow RAN1 progress

H602: PropAgree-> straightforward, follow RAN1 progress

H604: PropAgree-> straightforward, follow RAN1 progress

H603: DiscMail-> received different opinion offline, can be discussed via email in RAN2#110e. a tdoc will provided by the proponent

H605: DiscMail-> a tdoc will provided by the proponent

H609: DiscMail-> a tdoc will provided by the proponent

DiscMail:

E283: Related to antenna port, E288, need more time to check with RAN1.

E288

E297: Need more time to check with RAN1.

ConcReject:

H032: Forgot to change the status in the last round review.